APPENDIX A
WEAPON REFERENCE DATA

A leader must understand the capabilities of his available weapons systems to employ them appropriately. This appendix describes the characteristics of the TOW, MK19 (40-mm), and M2 (caliber .50 MG).

A-1. TOW CHARACTERISTICS

The basic TOW missile, the BGM-71A, has a maximum range of 3,000 meters. All other models have a maximum range of 3,750 meters. All TOW missiles have a minimum arming range of 65 meters except the TOW 2B, which has a minimum arming range of 200 meters.

a. **Types.** Table A-1, page A-2, lists TOW missiles by type and plate data. Other characteristics are as follows--

(1) ***BGM-71A.*** The basic TOW warhead has a 5-inch, high-explosive, shaped-charge warhead. It is no longer planned for use in combat.

(2) ***BGM-71B.*** This upgraded warhead can fire at targets as far away as 3,750 meters. It is no longer planned for use in combat.

(3) ***BGM-71C.*** The improved TOW (ITOW) missile is the first model with the extensible probe. This probe allows the warhead to detonate at greater ranges and to achieve greater penetration than previous models.

(4) ***BGM-71D.*** The TOW 2 has a 6-inch full-caliber warhead with an extensible probe that can penetrate appliqué armor. The round also has a thermal beacon that enables it to overcome enemy electronic countermeasures (ECM) when fired from a TOW 2 launcher.

(5) ***BGM-71E.*** The TOW 2A warhead has an explosive charge in the tip of its extensible probe that detonates reactive armor. This enables the main warhead to penetrate the target.

(6) ***BGM-71F.*** The TOW 2B is a top attack (fly-over, shoot-down) missile. This missile can penetrate the most vulnerable part of an armored vehicle--the top deck of the turret and hull.

b. **Missile Selection.** Based on a thorough analysis of the factors of METT-TC, the leader determines specific missiles for different conditions. Missile-to-target selection preferences (by priority) are listed in Table A-2, page A-2. Flank shots increase the probability of a single-shot kill and reduce the chance of detection or engagement by enemy armor. This applies to any type of target.

c. **TOW Limitations.** FM 3-23.34 (23-34) discusses the following firing limitations in detail:

- Firing over water.
- Firing over electrical lines.
- Firing in windy conditions.
- Firing through smoke and area fires.
- Firing from bunkers and buildings.
- Clearance requirements.

TYPE OF TOW ROUND	HIGH-EXPLOSIVE ROUND		PRACTICE ROUND
	PLATE DATA		
Improved TOW (ITOW)	GUIDED MISSILE, SURFACE ATTACK, **ITOW, BGM-71C**	Extensible probe improves standoff and penetration	GUIDED MISSILE, PRACTICE, **ITOW, BTM-71A-1**
TOW 2	GUIDED MISSILE, SURFACE ATTACK, **TOW2, BGM-71D**	6-inch full-caliber warhead with probe penetrates appliqué armor; thermal beacon improves resistance to enemy ECM when round is fired through TOW2 launcher	GUIDED MISSILE, PRACTICE, **TOW2, BTM-71D-1B**
TOW 2A	GUIDED MISSILE, SURFACE ATTACK, **TOW2A, BGM-71E**	6-inch tandem warhead with probe tip charge penetrates reactive and basic armor	GUIDED MISSILE, PRACTICE, **TOW2A, BGM-71E**
TOW 2B	GUIDED MISSILE, SURFACE ATTACK, **TOW2B, BGM-71F**	Missile can fly over and shoot down on the vulnerable top of target	GUIDED MISSILE, PRACTICE, **TOW2B, BGM-71F**

Table A-1. TOW missile types.

TYPE OF TARGETS	TOW MISSILE SELECTION PRIORITY			
	FIRST	SECOND	THIRD	FOURTH
Tanks with appliqué armor	TOW 2	TOW 2A	TOW 2B	ITOW
Tanks with explosive reactive armor	TOW 2B	TOW 2A	TOW 2	ITOW
Tanks without appliqué or reactive armor	ITOW	TOW 2	TOW 2A	TOW 2B
Light-armored personnel carriers	ITOW	TOW 2	TOW 2A	TOW 2B
Light-armored wheeled vehicles	ITOW	TOW 2	TOW 2A	TOW 2B
Antiaircraft vehicles	ITOW	TOW 2	TOW 2A	TOW 2B
Armored vehicles in hull-defilade position	TOW 2B	TOW 2A	TOW 2	ITOW
Bunkers or fortifications	ITOW	TOW 2	TOW 2A	

Table A-2. Missile selection.

A-2. MK19 AND M2 CHARACTERISTICS

The addition of the MK19 and M2 (Table A-3) makes the antiarmor platoon more flexible than previous units equipped with only the TOW system. These weapons allow the platoon to engage personnel and light-armored vehicles with accurate fire past 2,000 meters. These weapons also allow the platoon to secure itself during movement. In restrictive terrain where a TOW may be ineffective, these weapons enable the platoon to engage enemy elements. They also provide the battalion commander with a highly mobile, hard-hitting force in operations where an enemy armor threat is minimal.

CHARACTERISTICS	MK19 (40-mm)	M2 (cal .50)
WEIGHT (TOTAL)	140.6 LBS	128 LBS
WEAPON (WITH BARREL)	75.6 LBS	84 LBS
TRIPOD	44.0 LBS	44 LBS
GUN CRADLE	21.0 LBS	NA
BARREL	NA	24 LBS
MAXIMUM RANGE	2,212 METERS	6,764 METERS
MAXIMUM EFFECTIVE RANGE		
POINT	1,500 METERS	1,500 METERS
AREA	2,212 METERS	1,830 METERS
RATE OF FIRE		
SUSTAINED	40 RPM	40 RPM
RAPID	60 RPM	40 RPM
CYCLIC	325 TO 375 RPM	450 TO 550 RPM

Table A-3. MK19 and M2 characteristics.

a. The MK19 fires HE and high explosive, dual-purpose (HEDP) rounds. The HE round is effective against unarmored vehicles and personnel. The HE round arms 18 to 30 meters after being fired and has a casualty-producing radius of 15 meters. The HEDP round arms at the same range as the HE and penetrates 50.8-mm of rolled homogeneous armor. The round also has a bursting radius of 15 meters. Unlike ammunition for the M2, the ammunition for the MK19 may not be mixed together.

b. The M2 employs standard ball, tracer, armor-piercing, incendiary, and armor-piercing (incendiary) ammunition. The tracer rounds are used to aid in observing fire. The incendiary rounds are used to produce an incendiary effect, especially against aircraft. The armor-piercing rounds are used against armored targets and can penetrate 25-mm of rolled homogeneous armor at 200 meters. The armor-piercing round can also penetrate 14 inches of sand at 200 meters.

c. Some countries equip their light-armored vehicles with appliqué armor, which reduces the effectiveness of the MK19 and M2. Gunners need to engage vehicles at closer range and expend more ammunition to destroy the vehicles. Gunners must continue to engage the vehicles until they see the desired results.